REMARKS

Claims 1-20 are pending. Claims 1, 5 and 15 have been amended. Applicants respectfully request reconsideration of the application in response to the non-final Office Action.

Claim Rejection – 35 U.S.C. §103(a)

Claims 1-20 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2004/0167670 to Goncalves *et al.* ("Goncalves") in view of U.S. Patent No. 6,266,142 to Junkins et al. ("Junkins") and U.S. Patent No. 5,477,459 to Clegg et al. ("Clegg"). Applicants respectfully traverse the rejection for at least the following reasons.

Overview

Applicants respectfully submit that there are three different concepts presented by the present invention and the applied prior art. The present invention involves using a light array distributed in a working area (a multi-room house, for instance) and determines the *world coordinate position* of a mobile robot in the working area using individually identified flickering lights controlled by the mobile robit. In contrast, Junkins is said to establish position and orientation measurements *between two objects*. Goncalves uses the *physical shape of landmarks* to detect the position of a mobile device.

As such, it might be possible for Goncalves to use Junkins to, for instance, dock the mobile device, or other function that requires the relative position between two objects to be known. For instance, Junkins can place a container 536 and crane container bucket 538 relative to a ship 532. Perhaps the crane could be a mobile

device, its positioning next to the ship being controlled in a system analogous to Goncalves. The point being, the two might be combinable, but not in a way that would result in the present invention. What is missing from the applied art is the use of a light array to determine position in a world coordinate system, and there is no reason, teaching or suggestion for a modification that will result in the present invention, for the reasons outlined below.

Detailed Analysis

As amended, claim 1 recites, a mobile robot, comprising: a communications module for transmitting a light source control signal to selectively control flickering of each of a plurality of light sources of a landmark array provided in a working space such that each of said plurality of light sources can be separately detected by its flickering; an *image* processing module for calculating *image coordinates* of at least one of the plurality of the light sources by separately detecting the at least one light source by selectively controlling the flickering the light source, controlled to flicker in response to the light source control signal, from an image signal obtained by a camera; a pose calculation module for calculating world position coordinates of the mobile robot in the working space *using the calculated image coordinates and previously stored world coordinates of the light sources*," among other features recited in claim 1.

The features emphasized for the present argument not that *image coordinates of the selectively flickered light source* and the *previously stored world coordinates* of the light sources in a working area. Junkins primarily uses a quadrant detector to find a line of sight of four or more light sources to give a relative position of the object with the light sources to the object moving relative to

it. The Junkins lights can be controlled, but not separately controlled, for calculating *world* position coordinates of the mobile robot in the working space *using the calculated image coordinates and previously stored world coordinates of the light sources.*

Goncalves describes a robot that includes a visual sensor, an example of which is a digital camera. (Goncalves at [0055]-[0056]). The visual sensor is used to visually recognize landmarks by there physical appearance (e.g., shape) to determine global position. (Goncalves at [0058]). Goncalves further describes that as the robot travels through its environment, it detects new physical landmarks, extracts 3-D features from the physical landmark, and determines displacements or positions from the robot to the respective features of the observed landmark. (See, Goncalves at [0083]-[0084]). Nowhere does Goncalves describe "calculating *world* position coordinates of the mobile robot in the working space *using the calculated image coordinates [of at least one of the plurality of the light sources by separately detecting the at least one light source by selectively controlling the flickering the light source, controlled to flicker in response to the light source control signal, from an image signal obtained by a camera] and previously stored world coordinates of the light sources,*" as recited in claim 1, as amended.

Applicants submit that Junkins does not supply the teachings missing from Goncalves. Junkins describes light beacons disposed on a first object and an electro-optical sensor disposed on a second object, where incident light energy from a beacon is measured as respective currents at leads or connections coupled to the electro-optical sensor, from which a rotational and translation movement *of the second object relative to the first object* can be determined. (See, Junkins at

col. 4, lines 9-26). That is, comparison of the currents flowing through the corresponding connections of the sensor can be used to determine the centroid location of the incident light, where the closer the incident light centroid is to a particular sensor connection, the larger the portion of current that flows through that connection. (See, <u>Junkins</u> at col. 4, lines 26-32). Nowhere does <u>Junkins</u> describe "calculating *world* position coordinates of the mobile robot in the working space *using the calculated image coordinates [of at least one of the plurality of the light sources by separately detecting the at least one light source by selectively controlling the flickering the light source, controlled to flicker in response to the light source control signal, from an image signal obtained by a camera] and previously stored world coordinates of the light sources*," as recited in claim 1, as amended.

Thus, no combination of <u>Goncalves</u> and <u>Junkins</u> teaches or suggests a mobile robot that includes "calculating *world* position coordinates of the mobile robot in the working space *using the calculated image coordinates [of at least one of the plurality of the light sources by separately detecting the at least one light source by selectively controlling the flickering the light source, controlled to flicker in response to the light source control signal, from an image signal obtained by a camera] and previously stored world coordinates of the light sources*," in the context of claim 1, as amended. (emphasis added).

<u>Clegg</u> was applied due to the inclusion of basing the processing of light signals on the wavelength of the detected light source. This recitation has been taken out of the independent claims, and in light of the disclosure of the paragraph bridging columns 5 and 6 of <u>Junkins</u>. It to does not cure the deficiencies of the rejection noted above.

Accordingly, Applicants submit that independent claim 1 is patentable over Goncalves, Junkins and Clegg and respectfully request that the rejection under 35 U.S.C. §103(a) of claim 1, and of claims 2-4, which depend therefrom, respectively, be withdrawn.

For reasons analogous to those presented for claim 1, Applicants submit that claims 5 and 15 are also patentable over Goncalves, Junkins and Clegg, and respectfully request that the rejection under 35 U.S.C. §103(a) of claims 5 and 15, and of claims 6-14 and 16-20, which depend therefrom, respectively, be withdrawn.

Conclusion

It is believed that this Amendment does not require additional fees. However, if additional fees are required for any reason, please charge Deposit Account No. 02-4800 the necessary amount.

In the event that there are any questions concerning this paper, or the application in general, the Examiner is respectfully urged to telephone Applicants' undersigned representative so that prosecution of the application may be expedited.

Respectfully submitted,

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